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Mass Transit and Its Externalities

Within urban economics, public infrastructure is an area of interest when evaluating a city's economic potential. In particular, in larger cities, mass transit plays an important role in the overall economic development of a region, since it is the most basic means of connecting individuals and businesses together. Despite this, the literature regarding the benefit of mass transit in urban development suggests that mass transit can bring more harm than good. This literature survey will examine several arguments regarding the effectiveness of mass transit on urban economic development, and it will analyze the gaps that exist in the current discussion regarding urban mass transit.

One criticism regarding mass transit is its overall social cost. The argument that Clifford Winston and Vikram Maheshri (2007) present regarding the relationship between mass transit and social cost is that the addition of urban transit systems reduces social welfare more than it benefits urban areas. In order to investigate this hypothesis, Winston and Maheshri use a model of supply and demand to explain the welfare effects associated with mass transit. On the demand side, the quantity demanded is hypothesized to depend on the average fare, as well as exogenous variables explaining the rail network (including density, average line length, and number of links) and city characteristics. On the short run costs side, their model breaks down short run costs based on output (in passenger miles), factor prices, and exogenous variables for network variables and other influences on cost. The study uses twenty-five different urban transit systems in the U.S. as its sample, though it should be noted that roughly two-thirds of rail miles analyzed come from New York City's transit system, since its traffic greatly exceeds all other urban transit systems in the study (Winston and Maheshri 2007).

After testing the significance of the variables comprising the demand and short run cost curves, Winston and Maheshri compare the consumer surplus and the deficits created by urban mass transit systems by integrating the difference between the inverse demand function and the cost function, where the resulting area represents the net benefits associated with an urban rail system. The benefits demonstrated pale in comparison to the costs associated with creating and maintaining the transit systems; the aggregate net benefits for all cities study was -4496 (in millions of 2000 dollars). In fact, with the exception of San Francisco's BART system, social net benefits are negative

for all transit systems (Winston and Maheshri 2007). A contributing factor to this phenomenon is that urban transit systems are largely funded through taxation, which creates a deadweight loss that is measured by the model. Additionally, there is insufficient evidence to suggest that other externalities – such as increased safety and commercial development – are caused by developments in urban mass transit. Winston and Maheshri argue that overall, urban transit systems continue to be an investment only because of the prestige and image associated with having a mass transit system in a city, since all other effects on social welfare are negative.

While Winston and Maheshri's study constructs a quantitative framework to evaluate the effects of an urban mass transit system, the slant of study's sample blurs the accuracy of its claims. The study uses New York City as its primary example, and though it explores several other urban transit systems, its use of New York City, easily the largest urban transit system of the sample, as its primary example exaggerates the effect that an urban mass transit system can have on social welfare. Because of this, it is difficult to conclude that adding an urban mass transit system would be harmful for any city, since the effects found in New York City are not representative of the effects in all cities. Other studies, by contrast, are more even in their coverage of their samples. Nathaniel Baum-Snow and Matthew Kahn (2005) apply a more balanced analysis when evaluating the effects of urban transit expansion. Their study investigates trends in overall transit ridership over time, and it explores possible benefits associated with increased ridership.

Unsurprisingly, the study echoes the sentiment presented by Winston and Maheshri – based on historical data, overall ridership has declined over time both due to the number of alternatives to public transportation and the decentralization of cities. But unlike Winston and Maheshri, Baum-Snow and Kahn approach their conclusions regarding urban mass transit's utility by evaluating commute time. Their model focuses on bid-rent curves, which track real estate prices as one moves further away from the center of a city, in order to evaluate the benefit associated with living closer or further away from a central business district (CBD). Taking into account the price of the land, the study evaluates the added benefit of time saved by living closer to the city center. Of the cities surveyed, Washington has the highest amount of hours saved, with more than 50,000 hours saved per workday. When put into a monetary value, the estimated worth of Washington's metro system exceeds $1 million a day (Baum-Snow and Kahn 2005). As a part of the overall discussion regarding mass transit, Baum-Snow and Kahn's finding adds valuable insight to the conversation by recognizing the value that mass transit can have outside of strictly monetary terms.

Despite this reported benefit, the study also acknowledges that not every aspect of mass transit is beneficial. In particular, Baum-Snow and Kahn argue that there is insufficient evidence to suggest that pollution and congestion, two negative externalities associated with vehicular transit, have decreased due to urban rail transit systems. As a policy recommendation, the study suggests that future investments be more focused on increasing bus access rather than rail investments, since bus routes are less costly to establish and connect suburb areas better than rail systems. Additionally, because pollution and congestion were not found to be significant, fears about buses causing one or both of those factors to increase are unfounded (Baum-Snow and Kahn 2005). In total, Baum-Snow and Kahn's analysis furthers the discussion regarding urban mass transit by offering both the pros and the cons to mass transit systems. By evaluating both sides of the argument, the study demonstrates why mass transit is still a debated topic today, since there are both advantages and disadvantages to its presence in a city.

Other studies suggest that urban rail transit systems may actually lead to increased centralization of poverty in cities. In their analysis, Edward Glaeser, Matthew Kahn, and Jordan Rappaport (2008) investigate why poor populations tend to live in urban areas. Using geocoded census data, the study finds that the poverty rate is 14.5% in the city center, while further away from the CBD, the poverty rate is only 8.3% (Glaeser, Kahn, and Rappaport 2008). The study attributes high concentrations of centralized poverty in cities to the notion that richer individuals migrate further away from the city where land is cheaper so they can own bigger homes, while the poor live in the city center instead. In order to test the hypothesis regarding poverty sorting in cities, the study regresses the log of land size and the log of income. The study then regresses time to work and the distance from work in order to test if transportation is a contributing factor toward the phenomenon of urban poverty sorting. The result of this is that nearly three-quarters of income sorting of poor individuals to the city center is due to public transportation (Glaeser, Kahn, and Rappaport 2008). The study concludes by suggesting that transportation-mode choice is a determining factor in poverty sorting; thus, mass transit systems will contribute to the phenomenon of centralized urban poverty because of its appeal as a mode of transportation to lower-income individuals. It is important to note that although mass transit systems may caused centralized urban poverty, the existence of centralized urban poverty may still be preferable to other alternatives. Regardless, Glaeser, Kahn, and Rappaport's investigation is significant toward the overall discussion regarding mass transit, because it establishes a causal link between mass transit and heightened levels of urban poverty.

The three studies mentioned provide several arguments to suggest that mass transit systems have negative externalities associated with them. In particular, the studies focus on trends associated with income, commute times, and overall cost of construction and maintenance as the primary phenomena associated with mass transit systems. What the literature does not adequately explain, however, is business development surrounding metro stations. The three papers analyze the issue of mass rail transit based on the costs to create the infrastructure, the commuting cost, the cost of land, and the income of nearby residents. Although all of these factors could be negatively affected by the development of metro lines and other forms of mass transit, these negative externalities could also be offset by positive externalities created by new business that mass transit brings to an area. Metro stations typically exist near high traffic, high business areas of cities. By establishing a rail transit line to an area, the cost may outweigh the business the rail itself generates, but if business near the metro station were to increase substantially because more individuals were able to access it, this could contribute to the overall benefit of the metro line, which, if large enough, could offset the overall cost of the project. Overall, as a next step in the discussion regarding mass transit, a separate analysis on the effect of additional metro stations on levels of business generated in surrounding areas of a city would need to be conducted in order to fully evaluate the consequences of mass transit systems.

References

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